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Understanding the Multifactorial Landscape of 'SAPHENO- FEMORAL JUNCTION VALVE' (SFJ) Incompetency: A Comprehensive Analysis of Risk Factors

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Abstract

This study delves into the intricate interplay of various factors influencing the development of 'SAPHENO-FEMORAL JUNCTION VALVE' incompetency, focusing on key variables such as Great Saphenous vein diameter, occupation, gender, BMI, hypertension, and diabetes. Through a thorough examination of 100 individuals, this research offers nuanced insights into the complex dynamics shaping GSV health.

Keywords: Venous leg ulcers (VLUs), venous insufficiency (CVI), venous hypertension

Introduction

Venous leg ulcers are defined as open lesions between the knee and ankle joint that occur in the presence of venous disease resulting in reduced mobility, poor quality of life, and financial implications. (1)

Skin substitutes and skin grafts can be used as a primary modality for large ulcers more than 25cm (2) Lipodermatosclerosis is a type of panniculitis characterized by pronounced skin induration and inflammation (3)

Infiltration of the primary inflammatory cells such as macrophages, lymphocytes, and plasma cells in the tissue site, producing inflammatory cytokines, growth factors, enzymes (4,5) Lymphocytes including T-lymphocytes and Blymphocytes are the next line of defense, and they play a crucial role in mediating inflammation by several complex mechanisms including secreting of cytokines, costimulation of lymphocytes, and production of antibodies and immune complexes.(6,7)

This is defined as an abnormally functioning venous system caused by venous valvular incompetence. Venous outflow may or may not be obstructed, and the abnormal function may affect the superficial venous system, the deep venous system, or both (8)

The development of this condition is influenced by multiple factors, including genetics, female sex, Dr. M. V. Raghavendra Rao. M.V et al International Journal of Medical Science and Current Research (IJMSCR)

pregnancies, age, prolonged standing, trauma, and obesity. Some of these factors can be mitigated through lifestyle (increasing exercise, controlling body weight, and avoiding smoking), but others are not modifiable and many individuals will inevitably develop CVD over time. (9)

This condition is diagnosed based on history, clinical presentation, and diagnostic tests, with duplex ultrasound being the gold standard (10)

Clinical assessment should describe the ulcer area, depth, edges, wound base, signs of infection, and peripheral skin changes (11)

The proinflammatory microenvironment is maintained by M1 macrophages, mainly through the release of IL-1 α , IFN- γ , and TGF- β 1.(12)

The majority of risk factors for the development of VLUs are non-modifiable, and patients often present more than one. These involve a family history of CVI, advanced age, female sex, previous thrombosis or pulmonary embolism, multiparity, lipodermatosclerosis, musculoskeletal and joint disease (13) Modifiable risk factors are obesity and sedentarism are also associated with venous disease (14)

This venous hypertension in the larger veins is transmitted to the skin's microcirculation, contributing to chronic changes in the soft tissue and skin. (15)

'SAPHENO- FEMORAL JUNCTION VALVE' incompetency poses a significant health concern, and understanding the contributing factors is crucial for effective management. In this study, we explore the association between GSV diameter and a range of variables, shedding light on potential risk factors.

Methods:

Our cohort comprised 100 participants, with BMI and GSV diameter measurements providing baseline data. Great Saphenous vein diameter was analysed in relation to gender, occupation, diabetes, and hypertension. Odds ratios and 95% confidence intervals were calculated to assess the likelihood of 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency.









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The severity of the disease is more among the diabetics population when compared to the non-diabetic.

Mean arterial hypertension may not be a direct causal factor of varicose veins and its complications but it may effect indirectly by impacting cardiac stress and arterial hypertension. The reverse mechanism is equally possible if venous stasis is left untreated which eventually lead to arterial hypertension. Hence venous hypertension status has to be addressed to prevent these complications.

Results:

Descriptive Statistics

In our investigation of factors influencing Greater Saphenous Vein (GSV) incompetency, we present a concise overview of the descriptive statistics for pivotal variables.

1. BMI and SFJ Size:

- 1. The mean Body Mass Index (BMI) was 26.21, indicative of the central tendency in our participant cohort.
- 2. BMI exhibited a standard deviation of 2.78, suggesting variability within the sample.
- 3. The BMI range spanned from a minimum of 22 to a maximum of 32, showcasing the diversity in participants' body compositions.

- 4. Furthermore, the Great Saphenous Vein Diameter revealed a mean of 8.37 with a standard deviation of 1.54.
- 5. GSV diameter demonstrated variability, ranging from a minimum of 5.80 to a maximum of 12.80.
- 2. Great Saphenous Vein Diameter by Gender:
 - Analysing Great Saphenous vein diameter by gender, we observed that among males, 21.00% had a diameter below 8mm, while 16.00% had a diameter exceeding 8mm.
 - In contrast, females displayed a higher percentage, with 27.00% having a diameter below 8mm and a substantial 47.00% exhibiting a diameter exceeding 8mm.
- 3. Great Saphenous Vein Diameter by Occupation:
 - Delving into the influence of occupation on Great Saphenous vein diameter, we found that individuals categorized as "others" had 22.00% with a diameter below 8mm.
 - Those with sitting or standing occupations had a notably higher percentage (45.00%) with a diameter exceeding 8mm, compared to 18.00% for "others."
- 4. Great Saphenous Vein Diameter by Diabetes:
 - Examining the impact of diabetes on Great Saphenous vein diameter, 19.00% of

Volume 7, Issue 2; March-April 2024; Page No 98-106 © 2024 IJMSCR. All Rights Reserved participants without diabetes had a diameter below 8mm, while 13.00% had a diameter exceeding 8mm.

- Diabetic individuals showed a slightly higher percentage (15.00%) with a diameter exceeding 8mm compared to those without diabetes.
- 5. Great Saphenous Vein Diameter by Hypertension:
- Considering the presence of hypertension, individuals without hypertension had 21.00% with a GSV diameter below 8mm, and 16.00% with a diameter exceeding 8mm.
- Notably, those with hypertension displayed a substantially higher percentage (47.00%) with a GSV diameter exceeding 8mm.

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Table of Great Saphenous vein diameter by gender				
Saphenous vein diameter	Gender			
	Male	Female	Total	
<8mm	10	27	37	
	21.00%	16.00%	37.00%	
>8mm	30	33	63	
	16.00%	47.00%	63.00%	
Total	40	60	100	
	40.00%	60.00%	100.00%	

Table of Great Saphenous vein diameter by occupation					
	Occupation	Occupation			
Saphenous vein diameter	others	Sitting or standing	Total		
<8mm	22	15	37		
	22.00%	15.00%	37.00%		
>8mm	18	45	63		
	18.00%	45.00%	63.00%		
Total	40	60	100		
	40.00%	60.00%	100.00%		

Table of Great Saphenous vein diameter by Diabetes				
Saphenous vein diameter	Diabetes			
	Absent	Present	Total	
<8mm	19	18	37	
	19.00%	18.00%	37.00%	

>8mm	13	15	63
	13.00%	15.00%	63.00%
Total	32	68	100
	32.00%	68.00%	100.00%

Table of Great Saphenous vein diameter by Hypertension				
Saphenous vein diameter	Hypertension			
	Absent	Present	Total	
<8mm	21	16	37	
	21.00%	16.00%	37.00%	
>8mm	16	47	63	
	16.00%	47.00%	63.00%	
Total	37	63	100	
	37.00%	63.00%	100.00%	

These descriptive statistics provide a succinct overview, offering insights into the central tendencies, variability, and distributions within our participant cohort. The subsequent analysis of odds ratios will further illuminate the complex relationships between these variables and the development of 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency.

Interpreting Crude and Adjusted Odds Ratios for 'SAPHENO- FEMORAL JUNCTION VALVE') Incompetency.

Crude Odds Ratio for the development JUNCTION VALVE' incompetency	of 'SAPHEN	O- FEN	IORAL
Effect	Odds ratio	95% Confide Limits	Wald nce
occupation (sitting and standing vs others)	3.66	1.56	8.61

Crude Odds Ratio for 'SAPHENO- FEMORAL JUNCTION VALVE' Incompetency:

The crude odds ratio assessed the association between 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency and occupation (sitting or standing vs. others) without considering the influence of other variables. The ratio of 3.66 (95% CI: 1.56 - 8.61) suggests that individuals in sitting or standing occupations are 3.66 times more likely to develop 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency compared to those in other occupations.

The initial analysis indicates a substantial association between occupation and 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency, emphasizing the potential role of occupational factors as an independent contributor.

The odds ratios derived from our statistical analysis offer valuable insights into the association between various factors and the development of 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency. Here, we interpret both the crude and adjusted odds ratios, shedding light on the nuanced relationships within our study.

Adjusted Odds Ratio for the development of 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency			
Effect	Odds 95% Wald		
	Tutio	Confidence Limits	
Occupation (sitting and standing vs others)	6.49	1.95	21.58
Gender (female vs male)	3.44	1.05	11.27
BMI (over weight and obese vs normal)	11.72	3.2	42.84
Hypertension (present vs absent)	6.24	1.72	22.62
Diabetes (present vs absent)	8	2.26	28.27

Adjusted Odds Ratios for 'SAPHENO-FEMORAL JUNCTION VALVE' Incompetency:

The adjusted odds ratios provide a more comprehensive understanding, accounting for the simultaneous influence of multiple variables.

Occupation (Sitting or Standing vs. Others):

The adjusted odds ratio of 6.49 (95% CI: 1.95 - 21.58) indicates that after adjusting for gender, BMI, hypertension, and diabetes, individuals in sitting or standing occupations are 6.49 times more likely to develop 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency compared to their counterparts in other occupations.

Interpretation: This higher adjusted odds ratio reinforces the significance of occupation in contributing to GSV incompetency, even when considering the potential confounding effects of other variables.

Gender (Female vs. Male):

An adjusted odds ratio of 3.44 (95% CI: 1.05 - 11.27) suggests that, after accounting for occupation, BMI, hypertension, and diabetes, females are 3.44 times more likely to experience 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency compared to males.

BMI (Overweight and Obese vs. Normal):

With an adjusted odds ratio of 11.72 (95% CI: 3.20 - 42.84), the impact of BMI on 'SAPHENO-FEMORAL JUNCTION VALVE' incompetency remains substantial. Individuals classified as overweight and obese have an 11.72 times higher likelihood of developing 'SAPHENO- FEMORAL

JUNCTION VALVE' incompetency compared to those with a normal BMI, considering the other variables in the model.

Hypertension (Present vs. Absent):

The adjusted odds ratio of 6.24 (95% CI: 1.72 - 22.62) signifies that individuals with hypertension, after adjusting for other factors, are 6.24 times more likely to have 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency compared to those without hypertension.

Diabetes (Present vs. Absent):

An adjusted odds ratio of 8.00 (95% CI: 2.26 - 28.27) indicates that individuals with diabetes are 8.00 times more likely to develop 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency compared to those without diabetes, when considering the effects of other variables.

Discussion:

Diabetes Mellitus, by virtue of its disease process, will bring about changes in the endothelium of blood vessels, both arteries and veins. In Case of veins, it may lead to venous insufficiency status, thereby causing venous stasis followed by stasis dermatitis and ulceration. Similar process is observed in case of varicose veins which eventually leads to dermatitis and ulceration followed by non-healing complications.

In case of diabetes mellitus patients with varicose veins, then the impact of venous insufficiency is doubted that venous insufficiency is due to endothelium dysfunction in the vein wall and venous insufficiency caused by varicose veins.

Summary

The observations that primary varicose veins (VVs) can develop in the presence of an intact and functional saphenous-femoral junction (SFJ), and that pathological changes are often first noted on the more distal surface of valves, has led to a number of more recent theories concerning the aetiology of primary VVs. However, the long-held "Trendelenburg" theory of progressive, descending, valvular incompetence, although often refuted, remains widely taught and accepted.

Numerous contributing aetiological risk factors havebeendescribedsuchas

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pregnancy, obesity, heredity, and ethnicity, but there is still no clear base mechanism explaining how this disease process begins and progresses. For example, although prolonged sitting or standing may exacerbate, contribute to, or initiate a process, what is the sequence of cellular or physiological events that occurs to render the vein ultimately diseased or dysfunctional? Furthermore, and perhaps of greater importance here, is that the clinical presentation of VVs seems at odds with our current understanding of the underlying superficial incompetence.

Over the last ten years, with colour flow duplex ultrasound examination becoming increasingly available as a tool for accurate and repeated imaging of the peripheral vascular system, there has been an increase in the understanding of the patterns of venous incompetence underlying VVs. It seems that a spectrum might exist in terms of anatomical extent of reflux, severity of clinical disease and physiological compromise. Limited areas of reflux underlie mild, sometimes asymptomatic, disease whereas more advanced clinical problems are often associated with more diffuse incompetence. It remains, however, unclear as to the exact relationship between underlying incompetence and the patterns of varicosities seen with primary VVs.

Conclusion:

Our comprehensive analysis of the multifactorial landscape influencing 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency provides valuable insights into the intricate dynamics shaping venous health. Through the examination of 100 individuals, we explored key variables such as saphenous vein diameter, occupation, gender, BMI, hypertension, and diabetes. The results highlight the nuanced relationships among these factors and their collective impact on 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency.

Our descriptive statistics illuminated central tendencies, variability, and distributions within the participant cohort. Subsequently, odds ratios were calculated to assess the likelihood of 'SAPHENO-FEMORAL JUNCTION VALVE' incompetency, both in crude and adjusted models. The initial analysis revealed a significant association between specifically occupation, sitting standing or occupations, and **'SAPHENO-FEMORAL** JUNCTION VALVE' incompetency. Individuals in

these occupations were found to be 3.66 times more likely to develop 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency compared to those in other occupations. This underscores the potential independent contribution of occupational factors to venous health.

The adjusted odds ratios provided a more comprehensive understanding, considering the simultaneous influence of multiple variables. Occupation remained a significant contributor, with individuals in sitting or standing occupations being 6.49 times more likely to develop 'SAPHENO-FEMORAL JUNCTION VALVE' incompetency after adjusting for gender, BMI, hypertension, and diabetes. This study contributes to the growing body of knowledge surrounding venous health, paving the way for more effective strategies in the prevention and management of 'SAPHENO- FEMORAL JUNCTION VALVE' incompetency.

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